

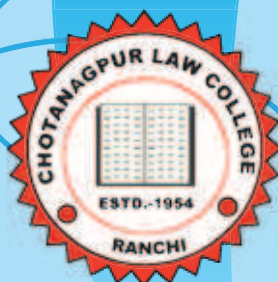
CHOTANAGPUR LAW JOURNAL

ISSN - 0973-5858

• Vol - 3

• No - 3

• 2010-11



Published by :

CHOTANAGPUR LAW COLLEGE, NAMKUM, RANCHI
RANCHI UNIVERSITY, RANCHI, JHARKHAND

Hazards of Hospital Wastes in India: Laws, Policies and Practice

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Introduction:

In the 21st century the human beings have achieved a lot through their innovative character. Right to health has been guaranteed to all without any discrimination. But despite these all achievements every one is bound to face various adverse ramifications in respect of health among them hospital waste is very crucial. Earlier hospital wastes were not considered as a serious issue but with the advent of infectious diseases, it has become a very important issue as it has a risk factor to the health of patients, hospital staffs, waste handlers and extending beyond the boundaries of the medical establishment to the general population too. The persons involved in hospital waste are at more risk than others. Further, physical and health hazards are also associated with the high operating temperatures of incinerators and steam sterilizers and with toxic gases vented into the atmosphere after waste treatment. Hence, the collection and proper disposal has become a significant concern for both the medical and the general community. In this paper, an attempt has been made to outline the legal aspects of hospital wastes in India.

What is Hospital Wastes?

Hospitals are a place where patients' problems are diagnosed, analyzed and treated. During these activities generation of solid waste is unavoidable. This solid waste described with the term 'hospital waste', refers to all waste, biological or non-biological that is discarded and will never be used again.¹ Hospital waste is considered dangerous because it may possess pathogenic agents and can cause undesirable effects on human health and the environment. A better understanding of the composition of hospital waste is fundamental in order to choose the best disposition alternative.² Different countries have different definitions and classifications of hospital wastes which vary according to national circumstances, policies and regulations. The term 'hospital wastes' is defined in various codes, documents and laws as under-

Hospital wastes refers to all wastes, biological or non-biological, that is discarded and not intended for further use and these include: pathological, infectious, hazardous chemicals, radioactive wastes, stock cultures, blood and blood products, animal carcasses, pharmaceutical wastes, pressurized containers, batteries, plastics, low level radioactive wastes, disposable needles, syringes, scalpels and other sharp items. These

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1 S. Altin (et al.), "Determination of Hospital Waste Composition and Disposal Methods: a Case Study", Vol. 12, No. 2, 2003 *Polish Journal of Environmental Studies* 251-255 at 251

2 *Ibid.* at 256

are in addition to food service, cleaning and miscellaneous wastes.³

All the waste generated by health-care establishments, research facilities, and laboratories. In addition, it includes the waste originating from minor or scattered sources such as that produced in the course of health care undertaken in the home (dialysis, insulin injections, etc.)⁴

Hospital wastes are heterogeneous mixtures composed of general refuse, laboratory and pharmaceutical chemicals and their containers, and pathological wastes. As a result, some infectious wastes do not separate from general waste.⁵

The hospital wastes include pathological and radio active wastes. Pathological waste means tissues, organs of body parts, human fetuses, animal carcasses and most blood and body fluids. The radioactive waste (solid, liquid, and gaseous wastes contaminated with radio nuclides) is generated from invitro or invivo testing.⁶

Hospital Waste Management Rules, 2005 of Pakistan defines hospital waste as-

Hospital waste includes both risk waste and non-risk waste.⁷ Risk waste means infectious waste, pathological, sharps, pharmaceutical waste, genotoxic waste, chemical waste and radioactive waste.⁸ Further, non-risk waste means includes paper and cardboard, packaging, food waste and aerosols and the like.⁹

In a broader term, biomedical waste is defined in Rule 3 (5) of the Bio-Medical Waste (Management and Handling) Rules, 1998 which is also useful for us as-

"Bio-medical waste" means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule I.

Health care waste includes waste from clinics, hospitals, laboratories, blood banks, dental clinics, birth centers and animal hospitals. It also includes waste from vaccination programs and medical aid missions, and waste produced when caring for the ill at home.¹⁰

Healthcare waste is the by-product of health services rendered to the population by health care providers like public and private hospitals, general practitioners academic and research institutions, medical laboratories, blood banks and blood collection services

3 S B Oyeleke, "The effects of hospital solid waste on the environment", Vol. 3 No. 3, 2008 *International Journal of Integrative Biology* 191-195 at 191

4 http://www.who.int/water_sanitation_health/medicalwaste/002to019.pdf

5 Suwannee Adsavakulchai, "Study on waste from hospital and clinics in Phitsanulok", Vol. 1 Issue 3, 2002 available at <http://cogprints.org/3224/1/2002-3-3.pdf>

6 M. Sridhar Acharyaulu, Hospital Waste: New Environment Hazard Problem of Enforcement in: D S Prakasa Rao, *FESTSCHRIFT Constitutional Jurisprudence and Environmental Justice*. (Visakhapatnam: Pratyusha Publishing Ltd.) at 621

7 Rule 2 (g)

8 Rule 2 (o)

9 Rule 2 (k)

10 Safe Handling of Health Care Waste available at <http://www.hesperian.info/assets/environmental/webmedwaste.pdf>

and other associated establishments.¹¹

Bio-medical waste is defined as waste that is generated during the diagnosis, treatment or immunisation of human beings and are contaminated with patients' body fluids (such as syringes, needles, ampoules, organs and body parts, placenta, dressings, disposables plastics and microbiological wastes).¹²

Hospital wastes may be classified in two parts-

- **Non-hazardous waste-** This includes waste comprising of food remnants, fruit peels, wash water, paper cartons, packaging material etc.
- **Hazardous waste-** This may be infectious and toxic as-
 - (a) **Infectious wastes:** This includes dressings and swabs contaminated with blood, pus and body fluids; laboratory waste including laboratory culture stocks of infectious agents; excised tumours and organs, placenta removed during surgery, extracted teeth etc.; blood and blood products; needle, syringes, blades etc.
 - (b) **Toxic wastes:** This includes anesthetics, sedatives, antibiotics, analgesics, X-ray processing solutions etc.

The **World Health Organisation (WHO)** has classified the hospital wastes as-

- **Infectious wastes-** cultures and stocks of infectious agents, wastes from infected patients, wastes contaminated with blood and its derivatives, discarded diagnostic samples, infected animals from laboratories, and contaminated materials (swabs, bandages) and equipment (disposable medical devices etc.); and
- **Anatomic-** recognizable body parts and animal carcasses.
- **Sharps-** syringes, disposable scalpels and blades etc.
- **Chemicals-** for example solvents and disinfectants; and
- **Pharmaceuticals-** expired, unused, and contaminated; whether the drugs themselves (sometimes toxic and powerful chemicals) or their metabolites, vaccines and sera.
- **Genotoxic waste-** highly hazardous, mutagenic, teratogenic¹ or carcinogenic, such as cytotoxic drugs used in cancer treatment and their metabolites; and
- Radioactive matter, such as glassware contaminated with radioactive diagnostic material or radiotherapeutic materials;
- Wastes with high heavy metal content, such as broken mercury thermometers.

Further, the **Bio-Medical Waste (Management and Handling) Rules, 1998** provides the ten categories of hospital wastes, in Schedule-I, as-

Category	Waste Category
Category No. 1	Human Anatomical Waste (human tissues, organs, body parts)
Category No. 2	Animal Waste

11 Fazli Hakim Khattak, "Hospital Waste Management in Pakistan", Vol. 48 No. 1, 2009 Pak J Med Res available at <http://www.pmr.org.pk/hwm-Pakistan.htm>

12 N K Das (et al.), "A TQM Approach to Implementation of Handling and Management of Hospital Waste in Tata Main Hospital", available at <http://medind.nic.in/haa/t01/i1/haat01i1p75o.pdf>

	(animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal houses)
Category No 3	Microbiology & Biotechnology Waste (wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)
Category No 4	Waste sharps (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)
Category No 5	Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)
Category No 6	Solid Waste (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)
Category No. 7	Solid Waste (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc).
Category No. 8	Liquid Waste (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities)
Category No. 9	Incineration Ash (ash from incineration of any bio-medical waste)
Category No. 10	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.)

In nutshell, hospital waste refers to all waste generated, discarded and not intended for further use in the hospital.

Impact of Hospital Wastes:

Previously, when professional health care centers were not popular then the treatment totally depended on medicinal plants, which is presently known as herbal treatment. Those herbal treatments had short comings of being insufficient for severe diseases. But, owing to this natural treatment the pollution rate was also low. Presently, in modern era for treatment of these diseases many advanced type of drugs and medicines, which are made up of highly toxic substances are recommended, these are carcinogenic and cytotoxic in nature if not handled safely.¹³ The effects of hospital wastes are multidimensional and multifaceted. 'Improper management of waste generated in health care facilities causes a direct health impact on the community, the health care workers and on the environment. The waste generated in these institutions essentially consists of solids and liquid, which may be hazardous, infectious and non-infectious. It has been estimated that up to 85% to 90% of the waste generated in hospitals is non-infectious (free from microbes and has not been in contact with any body fluids, which is similar to domestic

13 AK Dwivedi (et al.), "Fate of hospital waste in India", Vol. 1 (3), 2009 *Biology and Medicine* 25-32 at 25

waste). It is the remaining 10% to 20% of waste that is of concern because it is hazardous and infectious. Currently, approximately 20% to 40% of hospital waste can be recycled, but many hospitals recycle only 10% leaving tremendous scope for improvement. In addition, waste that is un-segregated and not treated in the right manner would cause environmental pollution affecting the health of the community.¹⁴ For example, in 2000, WHO estimated that injections with contaminated syringes caused 21 million hepatitis B virus (HBV) infections (32% of all new infections), two million hepatitis C virus (HCV) infections (40% of all new infections) and 260 000 HIV infections (5% of all new infections). In addition, health-care activities generate significant amounts of hazardous waste such as mercury and expired pharmaceuticals, as well as large amounts of general waste.¹⁵ Following are some important impacts of hospital wastes¹⁶-

- Wounds from dirty needles, sharp instruments, and other sharps can cause many illnesses, including: Hepatitis B and C, tetanus, HIV/AIDS, infections, and other infections.
- Frequent contact with disinfectants, detergents, medicines, and laboratory chemicals can cause allergies, skin rashes, eye irritations, asthma and other breathing difficulties, and other reactions.
- Frequent contact with discarded antibiotics can cause antibiotic resistance, making these drugs less useful in fighting infections.
- Burning health care waste can release dangerous metals such as mercury, lead, and cadmium as well as toxic chemicals such as dioxins into the environment. These can cause cancers and many health problems.

Thus it is very much clear that the hospital wastes have numerous adverse effects on human beings as well as on environment.

International Scenario:

Due to the hospital waste's infectious and hazardous nature, it has become a serious issue at the international level. The following data¹⁷ shows the situation of hospital waste as-

Country	Quantity (kg/bed/day)
U. K.	2.5
U.S.A.	4.5
France	2.5
Spain	3.0
India	1.5

Following are some examples of status of hospital wastes as-

- A Study in **Libya** reveals that the hospitals surveyed had neither guidelines for separated collection and classification, nor methods for storage and disposal of generated waste. The average waste generation rate was found to be 1.3 kg/patient/day, comprised of 72% general healthcare waste (non-risk) and 28% hazardous waste. The average general waste

14 Biomedical Waste Management available at <http://www.bcpt.org.in/webadmin/publications/pubimages/biomedical.pdf>

15 http://www.hcwh.org/lib/downloads/waste/Safe_Healthcare_Waste_Mgmt.pdf

16 <http://www.hesperian.info/assets/environmental/webmedwaste.pdf>

17 http://isebindia.com/95_99/99-07-2.html

composition was: 38% organic, 24% plastics, and 20% paper. Sharps and pathological elements comprised 26% of the hazardous waste component. This deficiency indicates the need for an adequate hospital waste management strategy to improve and control the existing situation.¹⁸

- A study in **Iran** estimates that total medical waste, hazardous–infectious waste, and general waste generation rates in Tabriz city is 3.48, 1.039 and, 2.439 kg/bed-day, respectively. In the hospital waste studied, 70.11% consisted of general waste, 29.44% of hazardous–infectious waste, and 0.45% of sharps waste (total hazardous–infectious waste 29.89%). Of the maximum average daily medical waste, hazardous–infectious waste, and general waste were associated with N.G.O and private hospitals, respectively. The average composition of hazardous–infectious waste was determined to be 35.72% plastics, 20.84% textiles, 16.70% liquids, 11.36% paper/cardboard, 7.17% glass, 1.35% sharps, and 6.86% others. The average composition of general waste was determined to be 46.87% food waste, 16.40% plastics, 13.33% paper/cardboard, 7.65% liquids, 6.05% textiles, 2.60% glass, 0.92% metals, and 6.18% others. The average bulk densities of total medical waste, hazardous–infectious waste, and general waste were determined to be 99.58, 96.16 and 101.26 kg/m³, respectively. Medical waste is still handled and disposed of together with domestic waste, creating great health risks to health-care staff, municipal workers, the public, and the environment.¹⁹ Another study conducted in **Iran** indicated that the waste generation rate is 4.45 kg/bed/day, which includes 1830 kg (71.44%) of domestic waste, 712 kg (27.8%) of infectious waste, and 19.6 kg (0.76%) of sharps. Segregation of the different types of waste is not carried out perfectly. The results 13.3% of the hospitals use containers without lids for on-site transport of wastes. 60% of the hospitals are equipped with an incinerator and 40% have operational problems with the incinerators. In all hospitals municipal workers transport waste outside the hospital premises daily or at the most on alternative days. In the hospitals under study, there aren't any training courses about hospital waste management and the hazards associated with them.²⁰
- A study in **Egypt** indicated that the quantity of medical waste generated by hospitals was 1.249 tons/day. Almost two-thirds was waste similar to domestic waste. The remainder (38.9%) was considered to be hazardous waste. The survey results showed that segregation of all wastes was not conducted according to consistent rules and standards where some quantity of medical waste was disposed of with domestic wastes. The most frequently used treatment method for solid medical waste was incineration which is not accepted at the current time due to the risks associated with it. Only one of the hospitals was equipped with an incinerator which is devoid of any air pollution control system.²¹

18 M. Sawalem (et al.), “Hospital waste management in Libya: A case study”, Vol. 29 Issue 4, 2009 *Waste Management* pp. 1370-1375

19 Hassan Taghipour & Mohammad Mosaferi, “Characterization of medical waste from hospitals in Tabriz, Iran”, Vol. 407 Issue 5, 2009 *Science of The Total Environment* pp. 1527-1535

20 Mehrdad Askarian (et al.), “Results of a hospital waste survey in private hospitals in Fars province, Iran”, Vol. 24 Issue 4, 2004 *Waste Management*, pp. 347-352

21 Magda Magdy Abd El-Salam, “Hospital waste management in El-Beheira Governorate, Egypt”, Vol. 91 Issue

- A study in **United Kingdom** estimates that the standard of performance in clinical waste management in UK hospitals remains poor, with evidence of neglect of basic hygiene, housekeeping and safety standards. However, codes of practice exist, and despite implementation of the Hazardous Waste Regulations 2006 that provide further control on all wastes management issues, the reality of clinical waste management in some National Health Service (NHS) hospitals continues to be largely inadequate.²²
- A study in **Greece** found that inappropriate segregation practices were the dominant problem, which led to increased quantities of generated infectious waste and hence higher costs for their disposal. Infectious waste production was estimated using two different methods: one by weighing the incinerated waste (880 kg day⁻¹) and the other by estimating the number of waste bags produced each day (650 kg day⁻¹). Furthermore, measurements of the EC₅₀ parameter in wastewater samples revealed an increased toxicity in all samples.

Various attempts are made at the international level to protect and conserve the environment at the international level. **WHO** provided the first global and comprehensive guidance document in 1999, **Safe Management of Wastes from Health-Care Activities**, addressing aspects such as regulatory framework, planning issues, waste minimization and recycling, handling, storage and transportation, treatment and disposal options, and training. The **WHO**²³ observed that the management of health-care waste is an integral part of a national health-care system. A holistic approach to health-care waste management should include a clear delineation of responsibilities, occupational health and safety programs, waste minimization and segregation, the development and adoption of safe and environmentally-sound technologies, and capacity building. Recognizing the urgency of this problem, a growing number of countries have taken initial steps to respond to this need. These include the establishment of regulatory frameworks, development of national plans, and the demonstration of innovative approaches. However, funding for health-care waste management remains very inadequate. The WHO core principles (were developed during the International Health Care Waste meeting hosted by WHO in Geneva on June 20 - 22, 2007) require that all associated with financing and supporting health-care activities should provide for the costs of managing health-care waste. This is the duty of care. Manufactures also share a responsibility to take waste management into account in the development and sale of their products and services. The establishment and sustained maintenance of sound systems for health-care waste management depend on the availability of resources. Therefore, in keeping with the WHO core principles, WHO recommended as:

1. Governments should:

- _ allocate a budget to cover the costs of establishment and maintenance of sound health-care waste management systems
- _ request donors, partners and other sources of external financing to include an adequate contribution towards the management of waste associated with their interventions
- _ implement and monitor sound health-care waste management systems, support capacity

3, 2010 *Journal of Environmental Management* pp. 618-629

22 J.I. Blenkarn, "Standards of clinical waste management in hospitals—A second look", Vol. 121 Issue 7, 2007 *Public Health*, pp. 540-545

23 http://www.who.int/water_sanitation_health/medicalwaste/hcwprinciples/en/index.html

building, and ensure worker and community health.

2. Donors and partners should:

_ include a provision in their health program assistance to cover the costs of sound healthcare waste management systems.

3. Non-governmental organizations should:

_ include the promotion of sound health-care waste management in their advocacy
_ undertake programs and activities that contribute to sound health-care waste management.

4. The private sector should:

_ take responsibility for the sound management of health-care waste associated with the products and services they provide, including the design of products and packaging.

5. All concerned institutions and organizations should:

_ promote sound health care waste management
_ develop innovative solutions to reduce the volume and toxicity of the waste they produce and associated with their products
_ ensure that global health strategies and programs take into account health-care waste management.

Taking into account the Declaration of the United Nations Conference on the Human Environment (Stockholm, 1972), the Cairo Guidelines and Principles for the Environmentally Sound Management of Hazardous Wastes adopted by the Governing Council of the United Nations Environment Programme (UNEP) by decision 14/30 of 17 June 3 1987, the Recommendations of the United Nations Committee of Experts on the Transport of Dangerous Goods (formulated in 1957 and updated biennially), relevant recommendations, declarations, instruments and regulations adopted within the United Nations system and the work and studies done within other international and regional organizations, **the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal** has been agreed which is the most comprehensive global environmental agreement on hazardous and other wastes. The Convention has 175 Parties and aims to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes. The Basel Convention came into force in 1992. It is also applicable to healthcare waste.

The International Workshop on Hospital and Municipal Solid Waste Management²⁴ recommended the following points on hospital waste management-

- a. Provide training for waste handlers in hospitals;
- b. Track the waste source
- c. Sell the waste per weight
- d. Maximize separation of hazardous and non-hazardous waste
- e. Separate the non-hazardous waste
- f. Avoid/reduce use of use / disposable items
- g. Separate close to the source to avoid mixing or contamination

24 17-21 February 1997, Quezon City, Metro Manila, Philippines

- h. Set attainable standards
- i. Discourage in-house handling without separation
- j. Discourage of tampering hazardous waste
- k. Contracting SMEs for non hazardous waste

In this way, at the international level, a progressive mechanism has been adopted.

Pakistan:

The problem of hospital waste is also prevalent in Pakistan. 'Studies in Pakistan show that large hospitals generate 2.0 kg of waste, per bed per day.'²⁵ A study²⁶ estimates that the critical situation was observed with respect to the hospital waste management at all stages, from generation, handling and primary storage, internal collection, central storage and final disposal. Another study²⁷ reveals that hospital wastes are simply mixed with the municipal waste in collecting bins at roadsides and disposed off similarly. Some waste is simply buried without any appropriate measure. The reality is that while all the equipment necessary to ensure the proper management of hospital waste probably exists, the main problem is that the staff fails to prepare and implement an effective disposable policy.

Pakistan Environmental Protection Ordinance 1997 is probably the most comprehensive statute that also governs the healthcare waste management domain. It assigns extraordinary status to HCW however poor implementation has become a major concern.²⁸ In exercise of powers conferred under section 31 of the Pakistan Environmental Protection Act 1997²⁹, the Federal Government of Pakistan made Hospital Waste Management Rules, 2005 in which there are 26 rules. Rule 3 lays down the responsibility of hospitals for proper management of waste. The superintendent of the hospital will form a Waste Management Team and this team will be responsible for the preparation, monitoring, periodic review, revision or updating.³⁰ The meeting of members of the Team shall be held at least twice a month.³¹ The duties and responsibilities of medical superintendent,³² Head of Departments,³³ infection control officer,³⁴ chief pharmacist,³⁵

25 http://www.env.go.jp/recycle/3r/en/asia/02_03-2/04.pdf

26 Hospital waste management & environmental assessment in Pakistani selected facilities Guidelines for Safe and Environmental Management, 2006 available at http://pdf.usaid.gov/pdf_docs/PNADL073.pdf

27 http://www.wwfpak.org/factsheets_hwf.php

28 Healthcare Waste Management in Karachi, Pakistan 2008 available at http://docs.google.com/viewer?a=v&q=cache:0KtL6Ysgb9QJ:www.waste.nl/redir/content/download/1899/12172/file/HCW%2520Karachi%2520ebook.pdf+Healthcare+Waste+Management+in+Karachi,+Pakistan+2008+pdf&hl=en&gl=in&pid=bl&srcid=ADGEESg5a9JM8fbYGSPpApqjIKW2Kbsbb1HO2aY9TK8vamOmGssCXlyMA57AfmOIS0PAU6AimWXr8sniy3mXIh4yIuz0IGVnQx8JdsYJXz-LlAd2K7LiAkmdQt5r2Tc7XyzGBfW6qnuo&sig=AHIEtbR4o9WsCBfHgJO5_0ChbPI13Ipcw

29 Act No. XXXIV of 1997

30 Rule 5

31 Rule 6

32 Rule 7

33 Rule 8

34 Rule 9

35 Rule 10

radiology officer,³⁶ senior matron and head of administration,³⁷ hospital engineer,³⁸ waste management officer³⁹ is mentioned in a very nice mode. Further, the Rules provide a very systematic waste management plan in rule 15. A very useful mechanism has been created by this rule as risk waste shall be separated by non-risk waste at the ward beside, operation theatre, laboratory or in any other room where waste is generated by a doctor, nurse, or other person generating the waste.⁴⁰ Waste shall be collected in accordance with the schedules specified in the Waste management Plan.⁴¹ Provisions relating to waste transportation,⁴² waste storage,⁴³ waste disposal,⁴⁴ waste minimization and reuse⁴⁵ are specifically mentioned. To assure the enforcement of these rules, the health officers may inspect any hospital, incinerator or landfill located in area of jurisdiction.⁴⁶ The hospital waste management advisory committee is also created.⁴⁷ In these rules, the Federal Government has a wide discretionary power to exempt any class of hospitals from all or any of the provisions of these rules. Thus a good attempt has been made to tackle the hazards of hospital wastes in Pakistan.

Bangladesh:

In Bangladesh, there is no any specific legislation pertaining directly to the handling, transportation or disposal of medical waste in the Bangladesh Environmental Protection Act, 1995. However, wastes are classified under Section 2 (l) as ‘any liquid, solid and radioactive substance that is discharged, disposed, or dumped which may cause adverse/negative change to the environment.’⁴⁸

Bhutan:

Currently, there are no separate rules for healthcare waste management in Bhutan; they are handled as part of the Water and Sanitation Rules, 1995. The Water and Sanitation Rules, 1995 briefly discusses the guidelines for collection, transportation and disposal of solid waste from different sectors. However, the existing legislation lacks clear categorization of bio-medical waste and hazardous waste.⁴⁹ However, the waste from clinics is collected separately in disposal bags and incinerated; a few hospitals in Bhutan are equipped with incinerators.⁵⁰

Srilanka:

National Environmental Act is responsible for environmental protection in Sri Lanka. The National Environmental Act No. 47 of 1980 with its amendments No. 56 of 1988 and No.

36 Rule 11

37 Rule 12

38 Rule 13

39 Rule 14

40 Rule 16

41 Rule 17

42 Rule 18

43 Rule 19

44 Rule 20

45 Rule 22

46 Rule 23

47 Rule 24

48 <http://www.faculty.ait.ac.th/visu/pdfs/Conference/HWMS.pdf>

49 *Ibid*

50 http://www.rrcap.unep.org/pub/soe/bhutan_solid.pdf

53 of 2000 are the basic legal documents that regulate the management of healthcare waste in Sri Lanka. But in reality, these legal instruments are of no use as far as the health sector is concerned due to technical/legal oversight. At present, there is no proper legal framework to regulate it.⁵¹

Indian Scenario:

Medicine and surgical operations help in curing diseases. But if we do not learn the methods of disposing the waste generated in the process, the treatment will cause the disease. Then the very purpose of the medical inventions and scientific research will be defeated.⁵² Medical waste management is considered as one of the critical task of any solid waste management program.⁵³ As 'handling, segregation, mutilation, disinfection, storage, transportation and final disposal are vital steps for safe and scientific management of biomedical waste in any establishment⁵⁴ so hospital wastes should be managed according to its category and characteristics. From acquisition to disposal the waste should be managed at every step. India, being the signatory of various international treaties, conventions, and covenants, has enacted laws to protect the environment and human beings. 'The first draft rules of the Indian Ministry of Environment and Forests, which were issued in June 1995, ignored all international trends and recommended that all 50 bedded hospital and above must install on-site incinerators.'⁵⁵ The issue of indiscriminate [hospital] waste management in India has attracted the attention of the highest judicial body at the level of Hon'ble Supreme Court of India and Apex Court has, from time to time, issued instructions.⁵⁶ In a Public Interest litigation *Dr. B. L. Wadhera v. Union of India*⁵⁷, the Hon'ble Supreme Court regarding hospital wastes through **Justice Kuldip Singh** directed to-

- a. Government of India to construct and install incinerators in all the hospitals/nursing homes, with 50 beds and above, under their administrative control.
- b. The All India Institute of Medical Sciences, New Delhi to install sufficient number of incinerators, or an equally effective alternate, to dispose of the hospital waste to indicate the progress made in this respect.
- c. The MCD and NDMC to issue notices to all the private hospitals/nursing homes in Delhi to make their own arrangements for the disposal of their garbage and hospital waste. They be asked to construct their own incinerators. In case these hospitals are permitted to use facilities (for collection, transportation and disposal of garbage) provided by the MCD and NDMC then they may be asked to pay suitable charges for the service rendered in

51 <http://www.faculty.ait.ac.th/visu/pdfs/Conference/HWMS.pdf>

52 M. Sridhar Acharyaulu, Hospital Waste: New Environment Hazard Problem of Enforcement in: D S Prakasa Rao, *FESTSCHRIFT Constitutional Jurisprudence and Environmental Justice*. (Visakhapatnam: Pratyusha Publishing Ltd.) at 621

53 Golrokh Koushiar (et al.), "A Comprehensive Survey on the Present Status of Hospital Waste Management in Iran: A Case Study of Rasht", Vol. 6(3), 2006 *Journal of Applied Science* 721-725 at 721

54 SKM Rao (et al.), Biomedical Waste Management : An Infrastructural Survey of Hospitals, Vol. 60 No. 4, 2004 *Medical Journal Armed Forces India* 379- 382

55 Ravi Agarwal, Medical Waste Issues, Practices and Policy: An Indian and International Perspective, 1998 available at http://www.toxicslink.org/docs/06078_Medical_Waste_Issues_Practices_Policy.pdf

56 Mukesh Yadav, "Hospital Waste - A Major Problem", Vol. 8 No. 4, 2001 *JK-Practitioner* 276 - 202

57 1996 SCC (2) 594, JT 1996 (3) 38

accordance with law.

The Central Pollution Control Board and the Delhi Pollution Committee to regularly send its inspection teams in different areas of Delhi/New Delhi to ascertain that the collection, transportation and disposal of garbage/waste is carried out satisfactorily. The Board and the Committee shall file the reports in this Court by way of an affidavit after every two months for a period of two years.

In this tune, under the provisions of the Environment (Protection) Act, 1986 (29 of 1986), the Ministry of Environment & Forests, Govt. of India made **the Bio-Medical Waste (Management and Handling) Rules, 1998** to tackle the hazards of hospital wastes. These rules apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio medical waste in any form.⁵⁸ Various terms are defined in Rule 3. Every occupier of an institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank by whatever name called is under duty to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.⁵⁹ Rule 5 lays down that before disposal, the hospital wastes require treatment which involve disinfecting the waste, right at source so that it is no longer the source of pathogenic organisms. After such treatment, the rest can be handled safely, transported and stored like- glassware should be disinfected, cleaned and sterilized; gloves should be torn/mutilated before disposal; liquid infectious wastes should be treated with a chemical disinfectant; swabs should be chemically disinfected etc. Every occupier, where required, shall set up in accordance with the time-schedule in Schedule VI, requisite bio-medical waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste, or, ensure requisite treatment of waste at a common waste treatment facility or any other waste treatment facility. Rule 6 says that bio-medical waste shall not be mixed with other wastes. Bio-medical waste shall be segregated into containers/bags at the point of generation in accordance with Schedule II prior to its storage, transportation, treatment and disposal. The containers shall be labeled according to Schedule III as given below-

Colour Coding and Type Of Container for Disposal of Bio-Medical Wastes

Colour Coding	Type of Container	Waste Category
Yellow	Plastic bag	Cat.1- Human Anatomical Waste Cat. 2- Animal Waste Cat. 3- Microbiology & Biotechnology Waste Cat. 6- Solid Waste
Red	Disinfected container/ plastic bag	Cat. 3- Microbiology & Biotechnology Waste Cat. 6- Solid Waste Cat.7- Solid Waste
Blue/White	Plastic bag/puncture proof Container	Cat. 4- Waste sharps Cat. 7- Solid Waste

⁵⁸ Rule 2

⁵⁹ Rule 4

Black	Plastic bag	Cat. 5- Discarded Medicines and Cytotoxic drugs Cat. 9- Incineration Ash Cat. 10- Chemical Waste
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Notwithstanding anything contained in the Motor Vehicles Act, 1988, or rules thereunder, untreated biomedical waste shall be transported only in such vehicle as may be authorised for the purpose by the competent authority as specified by the government. No untreated bio-medical waste shall be kept stored beyond a period of 48 hours but if for any reason it becomes necessary to store the waste beyond such period, the authorised person must take permission of the prescribed authority and take measures to ensure that the waste does not adversely affect human health and the environment.

For granting authorisation and implementing these rules, the Government of every State and Union Territory shall establish a prescribed authority with such members as may be specified. The prescribed authority is authorized to grant or renew an authorisation to possess the necessary capacity to handle bio-medical waste on application. Every occupier of an institution generating, collecting, receiving, storing, transporting, treating, disposing and/or handling bio-medical waste in any other manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/service to less than 1000 (one thousand) patients per month, shall make an application in to the prescribed authority for grant of authorisation. Every operator of a bio-medical waste facility shall make an application to the prescribed authority for grant of authorisation.⁶⁰ An authorisation shall be granted for a period of three years, including an initial trial period of one year from the date of issue. Thereafter, an application shall be made by the occupier/operator for renewal. The prescribed authority may after giving reasonable opportunity of being heard to the applicant and for reasons thereof to be recorded in writing, refuse to grant or renew authorisation. Every application for authorisation shall be disposed of by the prescribed authority within ninety days from the date of receipt of the application. The prescribed authority may cancel or suspend an authorisation, if for reasons, to be recorded in writing, the occupier/operator has failed to comply with any provision of the Act or these rules.⁶¹ The rules provides to establish an advisory committee to advise the State Govt. regarding implementation of the rules.

Rule 10 lays down that every occupier/operator shall submit an annual report to the prescribed authority by 31 January every year, to include information about the categories and quantities of bio-medical wastes handled during the preceding year. The prescribed authority shall send this information in a compiled form to the Central Pollution Control Board by 31 March every year. If any accident takes place, at any institution or facility or any other site where bio-medical waste is handled or during transportation of such waste, the authorised person shall report the

60 Rule 8

61 Rule 7

accident to the prescribed authority forthwith.⁶²

Rule 13 provides for appeal as any person aggrieved by an order made by the prescribed authority under these rules may, within thirty days from the date on which the order is communicated to him, prefer an appeal to such authority as the Government of State/Union Territory may think fit to constitute.

Thus, the Govt. of India has done a good attempt, in principle, to tackle the hazards of hospital wastes. But if we analyse the implementation part of these rules, the situation is worst. A study⁶³ done by Indian Institute of Management, Lucknow estimates that half the bio-medical waste generated in the country's hospitals is just dumped with municipal garbage, without any special treatment. Further, it says that presently 50-55 per cent of bio-medical wastes is collected, segregated and treated as per the Bio-medical Waste Management Rules. Rest is dumped with municipal solid wastes. Each day, more than 4.2 lakh kg of biomedical waste is generated in the country, but there are only 157 facilities qualified to treat the waste. In institutional terms, an inventory showed that of the 84,809 hospitals and healthcare facilities in India, only 48,183 are using either common biomedical waste treatment facilities or have engaged private agencies to treat their waste.

A study,⁶⁴ with the objective of assessing the level of awareness about the various aspects of biomedical waste and disposal practices by the medical practitioners, was conducted in Gujarat where doctors and auxiliary staff of 30 hospitals were the study population. While all the doctors knew about the existence of the law related to biomedical waste but details were not known. Doctors were aware of risk of HIV and Hepatitis B and C, whereas auxiliary staff (ward boys, ayabens, sweepers) had very poor knowledge about it. There was no effective waste segregation, collection, transportation and disposal system at any hospital in the district. Another study⁶⁵ reveals that the awareness and proper practice of biomedical waste was very satisfactory as the majority of staff (teaching and non-teaching) were conscious of the measures for safe collection and final disposal of biomedical waste which is in contrast to the finding of above study.

As **Kerala High Court** observed that it is the responsibility of the Central Pollution Control Board and the State Board or the Committee to monitor the working of the system and ensure due compliance of the standards regarding ground water, ambient air, leachate quality and the compost quality including incineration standards as specified under Schedules II, III and IV. It is equally important to comply with the requirements in Rule 6 of the Rules, particularly, the authorisation to be issued by the State Board or the Committee in Form III.⁶⁶ But, '[t]here is

62 Rule 12

63 *The Hindu*, April 13, 2010, Tuesday at <http://www.thehindu.com/news/national/article395719.ece>

64 NB Pandit (et al.), "Management of bio-medical waste: awareness and practices in a district of Gujarat", Vol. 49 (4), 2005 *Indian Journal of Public Health* 245-247

65 MC Yadavannavar (et al.), "Biomedical waste management: A study of knowledge, attitude, and practices in a tertiary health care institution in Bijapur", Vol. 35 Issue 1, 2010 *Indian Journal of Community Medicine* 170-171

66 *Sumit v. Payyannur Municipality* 2004 (1) KLT 438 Kerala

no attempt to minimize the quantity of waste generation; neither there is any attempt to switch over from more toxic to less toxic substances in respect of their use. Attempts are not being made regarding search or innovation of alternative article, equipments or liquids which are in use and are highly toxic like that of mercury, ethylene oxide, poly vinyl chloride etc. Thus, it is clear that no efficient management of hospital waste is in existence. Rules in the form of Acts are also inadequate and lack of commitment to implement these Acts is common. Therefore, not only the private institutions, even the government health institutions are not interested in proper management and disposal of their wastes in accordance to the environmental rules.⁶⁷

Reasons for Failure: Perhaps the cost of construction, operation and maintenance of system for managing waste is very much responsible for non-establishment of mechanism to dispose the hospital wastes. As Surjit S. Katoch states that the main reasons for improper management of the biomedical waste are financial and technological constraints and difficulty in monitoring of scattered health care facilities.⁶⁸ **WHO** estimates the reasons for failure as lack of awareness about the health hazards, insufficient financial and human resources and poor control of waste disposal. Many countries do not have appropriate regulations, or do not enforce them. An essential issue is the clear attribution of responsibility of appropriate handling and disposal of waste. According to the 'polluter pays' principle, this responsibility lies with the waste producer, usually being the health-care provider, or the establishment involved in related activities.⁶⁹

Concluding Observation:

Undoubtedly, the medicines and drugs have played a very crucial role to cure the people but on other hand it also should be kept in mind very well that the wastes of hospital must be disposed in a proper manner otherwise the all development and research in medical field intended for welfare of people, at mass level, will be proved futile and meaningless as the hospital wastes cause a grave threat to human being as well as environment also. It is our joint social responsibility of all to see that pathological wastes should not be dumped in streets, lanes or in front or back of hospitals. Actually, it is the duty of medical professionals to see that any hazardous waste must not be left anywhere rather that must be disposed in prescribed mode. Further, state is also under legal duty to enact effective laws so that the society may be saved from unexpected problems related to entity of human being.

67 AK Dwivedi (et al.), "Fate of hospital waste in India", Vol. 1 (3), 2009 *Biology and Medicine* 25-32 at 32

68 Surjit S. Katoch, "Biomedical Waste Classification and Prevailing Management Strategies", Proceedings of the International Conference on Sustainable Solid Waste Management, 5 - 7 September 2007, Chennai, India. pp.169-175 available at http://www.swlf.ait.ac.th/IntlConf/Data/ICSSWM%20web/FullPaper/Session%20IV/4_06%20SS%20Katoch_.pdf

69 <http://www.who.int/mediacentre/factsheets/fs253/en/>